

## CHAPTER 4: STATEWIDE CONSERVATION STRATEGIES

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Having identified 1,240 priority species within South Carolina and, using currently available data, the current condition (including the condition of “unknown”) of these species and their habitats, as well as the challenges to those species and habitats, the focus now moves to conservation strategies to address those challenges. As conservation strategies were developed for each species, it became evident that they could be separated into eight categories, which we have designated as Conservation Action Areas (CAAs). These CAAs are presented in Box 4-1.

Because major challenges to species and habitats are similar across taxonomic groups and habitats, conservation strategies to address those challenges are also similar. In order to simplify the strategies South Carolina will employ to address threats, recommended species and habitat strategies are consolidated in this chapter by CAA. The specific conservation actions proposed for each species are presented in a separate volume, Supplemental Volume: Species and Habitat Accounts.

### **BOX 4-1: EIGHT CONSERVATION ACTION AREAS**

- Education and Outreach
- Habitat Protection
- Invasive and Non-native Species
- Private Land Cooperation
- Public Land Management
- Regulatory Actions
- Survey and Research Needs
- Urban and Developing Lands

Within each CAA, conservation actions were condensed from the recommendations prepared for each animal on South Carolina’s Priority Species List. Some of the actions identified will affect all species included in the CWCS; others may affect only a few species. In this chapter, the priority of each action is identified in brackets after each action. A brief discussion of conservation action prioritization is presented at the end of this chapter; a more complete discussion is presented in Chapter 7: Prioritization, Implementation and Adaptive Management.

Additionally, SCDNR recognized that there are overarching conservation strategies that are likely to assist in protecting wildlife and habitats statewide. Therefore, SCDNR determined that formation of Conservation Action Committees around each of the CAAs identified above would assist in determining these overarching strategies. Conservation Action Committees would provide an excellent opportunity to work with partners to develop comprehensive statewide strategies for South Carolina that were not tied specifically to a single species or habitat. The strong partnerships between SCDNR and other state and federal agencies, organizations, academic institutions and industries within the state demonstrate dedication to overcoming challenges inherent in implementing conservation strategies. Two Conservation Action Committees, those for Education and Outreach and Urban and Developing Lands, were convened prior to completion of the CWCS; the resulting conservation strategies are contained herein. Additional committee meetings will be held for the remaining CAAs as the CWCS is being implemented; resulting conservation strategies will be included in future revisions of the South Carolina CWCS.

## Education and Outreach

Education and outreach programs positively affect conservation activities by involving the broader community in these activities. As such, education and outreach programs are critical to successful wildlife and habitat conservation. In times of budgetary crises, when funding, personnel and resources become limited, education and outreach programs are often supplanted by more imminent needs associated with species and habitat protection. However, it may be most critical during such times to ensure that education and outreach programs are functioning; such programs can produce an informed public that can assist in achieving the goals of environmental conservation.

SCDNR currently has two education sections: one is based in Columbia and is managed by the Outreach and Support Services Division (OSS); the other is based in Charleston and is managed by the Marine Resources Division (MRD). Both sections are involved with formal education programs and public outreach programs. Many other sections throughout the SCDNR conduct outreach and education efforts specific to their program areas. Box 4-2 outlines current programs that are based in SCDNR and programs for which SCDNR is a major contributor or partner.

### BOX 4-2: SCDNR EDUCATION AND OUTREACH PROGRAMS

#### FORMAL EDUCATION PROGRAMS

- **Animal Program:** This program is designed to introduce students K-12 to the DNR and how the DNR protects and conserves our state natural resources. This program involves the use of live animals, mounts and “hands on” learning.
- **Aquatic Project WILD:** An interdisciplinary environmental and conservation education program of instructional workshops and supplementary curriculum materials for K-12 teachers emphasizing aquatic wildlife and ecosystems.
- **Boater Education Program:** This program teaches basic boating safety including proper safety equipment, navigation rules, boat trailering and preventive routine boat maintenance.
- **Becoming an Outdoors Woman:** This program exposes women over 18 years old to nature related outdoor activities such as hunting, fishing, bird watching, camping and more.
- **Camp Wildwood:** A week-long camp designed for high school students to increase their knowledge and experience with natural resources management.
- **Carolina Coastal Adventure:** A weekend workshop for high school students to study the coastal environment.
- **Coastal Discovery Cruise Program:** Cruise the coastal habitats on SCDNR’s educational vessel, *Discovery* and learn about immediate areas of concern within the coastal and inland regions of South Carolina, such as water quality, endangered species, and threatened habitats. Groups have the opportunity to discuss the biology of estuarine animals and plants with hands-on learning when the trawl drags in an array of marine species.
- **Earth Science Education Program:** Promotes the understanding of South Carolina’s geology, mineral resources and the principles of Earth Science.

**BOX 4-2: SCDNR EDUCATION AND OUTREACH PROGRAMS (CONTINUED)****FORMAL EDUCATION PROGRAMS (CONTINUED)**

- **ENVIROTHON:** A hands-on learning experience in the form of a team competition to stimulate high school students and provide incentive to learn about their role in nature.
- **Graduate Student Guidance and Training:** This program provides logistical and staff support to state colleges and universities for graduate and undergraduate training of marine science students.
- **Hunter Education Program:** This program provides instruction in hunter safety and techniques. Students also learn about hunting ethics, hunter/landowner relations and basic conservation and wildlife management principles.
- **Minorities in Marine and Environmental Science:** This program is a mentor-based summer program that provides college level minorities with training opportunities in marine and environmental science.
- **Project WET:** An interdisciplinary water education program of instructional workshops and supplementary curriculum materials for K-12 teachers emphasizing water related topics.
- **Project WILD:** An interdisciplinary environmental and conservation education program of instructional workshops and supplementary curriculum materials for K-12 teachers emphasizing terrestrial wildlife and ecosystems.
- **South Carolina Institute for Natural Resource Conservation:** This workshop provides hands-on studies in topics such as soils, forestry, land and water management, reclamation, wildlife, conservation leadership and career opportunities.
- **Trapper Education Program:** This program includes discussions on furbearer biology, history of the fur trade, wildlife management principles, fur harvest regulations and ethical conduct.
- **Weather and Climate Science Education:** Resources are provided to teacher through access to real-time weather and climate data, student interactions, teacher workshops and more.

**OUTREACH PROGRAMS**

- **4-H FACE for Wildlife Contest:** FACE (Food and Cover Establishment) for Wildlife is an annual statewide contest for youth that consists of planting and establishing food plots.
- **Audio/Visual Programs:** All programs within the SCDNR have representatives available to provide audio/visual presentations about the goals and objectives of those programs at the request of partners, educational facilities and private citizen groups.
- **Beach Sweep/River Sweep:** In partnership with the South Carolina Sea Grant Consortium, SCDNR coordinates an annual, nationwide cleanup of inland and coastal waterways.
- **Coastal Workshops:** These workshops are offered to teachers, students, lawmakers and business and community leaders to learn more about salt marsh ecology and estuarine animals.
- **Fishing Rodeos:** Youth fishing rodeos promote fishing as a positive alternative to the dangerous influences that abound in our society.
- **Jr. Duck Stamp Contest:** This contest enables students in grades K-12 to express their feelings of natural resources through their art and increases awareness of environmental concerns in an artistic manner.
- **Reel Art:** This contest enables students in grades K-12 to express their feelings of natural resources through their art and increases awareness of the aquatic environment in an artistic manner.
- **Reel Kids:** This program allows students to work toward goals like catching their first fish, learning about fish and improving their habitats.
- **Take One Make One Program:** An outdoor education and mentoring program aimed at developing South Carolina's youth and young adults into lifetime participants in conservation, hunting, angling and shooting sports activities through conservation education and adult mentoring.

**BOX 4-2: SCDNR EDUCATION AND OUTREACH PROGRAMS (CONTINUED)****OUTREACH PROGRAMS (CONTINUED)**

- **Young Outdoor Writers' Competition:** This is a natural resource magazine-article writing contest for students in grades 5 through 12.
- **Youth Hunts:** These hunts allow youth to have an educational hands-on experience in hunter safety and hunting techniques and exposes youth to basic wildlife management practices and hunting ethics.

**OUTREACH EVENTS**

SCDNR participates in many events throughout the state that allow education and outreach about the agency's mission and it's programs including the following:

Legislative Outreach Expo	Palmetto Sportsmen's Classic
Shallow Water Expo	Festival Hispano
Myrtle Beach Show	Southeastern Wildlife Exposition
Charleston Boat Show	Charleston In-Water Boat Show
Greenville Boat Show	

**PUBLICATIONS**

SCDNR provides many publications around all programs including the following:

Brochures	In-depth Reports
Newsletters	Books
Websites	<i>South Carolina Wildlife Magazine</i>

Although education and outreach may not directly contribute to management of resources, these programs can assist in garnering support for environmental programs. Public support can assist in ensuring the outstanding natural resources of South Carolina are conserved for future generations. In public meetings held throughout the state, SCDNR discovered that the public would genuinely like to assist in protecting natural resources, but that they were unsure what they could do to help. Additionally, the goals and mission of the SCDNR were unknown to some segments of South Carolina's population. Discovery of this information underscores the need for natural resource education and outreach programs throughout South Carolina.

*Conservation Actions*

- 1) Develop and enhance education and outreach programs that highlight the importance and value of the species on South Carolina's Priority Species List and their contribution to the unique natural resource diversity of this state. [Highest priority]
- 2) Develop and enhance education and outreach programs that encourage land stewardship values, particularly to private landowners in priority habitats. [Highest priority]
- 3) Develop and enhance education and outreach programs that inform the public about the importance of prescribed burning to benefit wildlife species. [Highest priority]
- 4) Ensure that accurate information about priority species and their habitats is made available, both within SCDNR and to any interested parties outside of the department. Interested parties can include state and federal agencies, academic institutions, private landowners, local municipalities, organizations and industry. [Highest priority]

- 5) Promote partnerships, both in development and implementation of education and outreach programs. [High priority]
- 6) Promote volunteer participation, both in education and outreach programs as well as in data collection. [High priority]
- 7) Develop and enhance education and outreach programs that inform the public about the detrimental impacts of litter on priority species. [Moderate priority]
- 8) Educate motor vehicle operators of the negative affects of crossing streams at multiple locations and using stream bottoms as trails. [Moderate priority]
- 9) Develop and enhance programs that educate fishermen about employing correct techniques for capture and release of marine mammals, fish and invertebrates and programs that educate fishermen about the importance of reporting ship strikes and entanglements to authorities. [Moderate priority]
- 10) Utilize a variety of methods for information dissemination including:
  - a. Printed materials
  - b. Websites
  - c. Formal education/outreach programs
  - d. Updates to existing education curricula
  - e. Demonstration sites
  - f. Landowner workshops
  - g. Media[Moderate priority]
- 11) Develop and enhance education and outreach programs that discourage stocking, release and transplanting nonnative animal and plant species throughout South Carolina. [Moderate priority]

#### *Education and Outreach Conservation Action Committee*

SCDNR recognized that there are many education/outreach programs being conducted throughout the state. Many public agencies, private organizations, educational institutions and industries provide such programs to the citizens of South Carolina. SCDNR further recognized that it would be impossible to achieve our goals without the valuable assistance offered by these entities and their programs. Therefore, partners were invited to participate in workshops to discuss natural resource education in South Carolina. Two Education and Outreach Committee workshops were held: one in Columbia and one in Charleston. Table 4-1 contains a list of participants and their affiliation.

At these meetings, partners were asked to identify major overarching education and outreach recommendations that would affect activities throughout the state of South Carolina. Both groups independently determined that in order to better insure consolidated and uniform messages are

being presented to the public, a catalogue of all natural resources programs offered in the state is badly needed. This catalogue should include contact persons for each program offered. The amount of information that this catalogue could contain is huge; further, programs are constantly being developed, contact people change routinely and information that needs to be included in individual programs constantly needs to be updated. Both groups also determined that partnerships between all natural resource education and outreach programs could be bolstered by development of South Carolina's CWCS.

**TABLE 4-1: EDUCATION/OUTREACH CONSERVATION ACTION COMMITTEE ATTENDEES**

<b>Name</b>	<b>Affiliation</b>
Wendy Allen	National Estuarine Research Reserve
Neil Bartley	South Carolina Department of Natural Resources
Steve Bates	South Carolina Department of Natural Resources
Dana Beach	South Carolina Coastal Conservation League
Devon Beaty	South Carolina Department of Health and Environmental Control
Melissa Bimbi	US Fish and Wildlife Service
Joy Boswell	South Carolina Department of Natural Resources
Warren Chavous	University of South Carolina - Salkehatchie
Jody Childs	University of South Carolina - Aiken
Janet Clark	South Carolina Department of Health and Environmental Control
Amy Curran	South Carolina Department of Health and Environmental Control
Larry DeLancey	South Carolina Department of Natural Resources
Caroline Foster	South Carolina Department of Natural Resources
Elaine Freeman	South Carolina State Park Service
Lex Glover	South Carolina Department of Natural Resources
Karen Hall	Clemson University
BeBe Harrison	South Carolina Department of Natural Resources
Sara Hartman	The Nature Conservancy
Will Haynie	Low Country Land Trust
Mischa Hey	The Nature Conservancy
Paula Keener-Chavis	National Oceanic and Atmospheric Administration
Susan Lovelace	National Oceanic and Atmospheric Administration
Whit McMillan	South Carolina Aquarium
Jennie Morris	South Carolina Forestry Commission
Lori Nowell	Sandhill Research Center
Michael Provost	The Nature Conservancy
Virginia Roberson	Centers for Ocean Sciences Education Excellence
Al Segars	South Carolina Department of Natural Resources
Lundie Spence	Centers for Ocean Sciences Education Excellence
Anna Toline	National Estuarine Research Reserve
Ernie Wiggers	Nemours Wildlife Foundation

As stated above, SCDNR is aware that information about our priority species is scarce and has currently not been provided to all partners throughout the state; SCDNR will strive to provide that information in the future. A suggestion was made to develop a map that would identify the locations of priority species and habitats to allow educators throughout the state to pick species and habitats for new program development. This map should be provided to all education and outreach entities in South Carolina.

Creation of a natural resource information database was also determined by the groups to be of major importance. As part of the CWCS process, SCDNR will be developing a department-wide database that will house all available data and information for the species on the priority list and their habitats. Although SCDNR cannot require all outside entities to submit data they collect on these species, all partners will be encouraged to submit data for inclusion in the SCDNR database. This database will allow anyone access to view this information. Quick and easy access to such data will enhance existing education and outreach programs throughout South Carolina.

Because there are 1,240 species on South Carolina's Priority Species List, it will be very difficult to develop separate education and outreach programs for each one. Therefore, it seems prudent to limit programs to a few "poster species" that will highlight conservation messages in each ecoregion of South Carolina. Further, existing programs should be enhanced to include priority species and their habitats into existing programs.

*Education and Outreach Conservation Action Committee Recommendations*

- 12) Ensure that all SCDNR employees are working to provide education and outreach information to partners and citizens of South Carolina by doing the following:
  - a. Dissemination of information to partners;
  - b. Cataloguing education and outreach programs in the state;
  - c. Updating the website catalogue annually; and
  - d. Coordination of priority species education and outreach efforts throughout the state.[Highest priority]
- 13) In consultation with SCDNR biologists, identify "poster species" that will highlight conservation messages in each ecoregion of South Carolina. Enhance existing education and outreach programs in SCDNR to include priority species and their habitats. [Highest priority]
- 14) Create a map that identifies locations of South Carolina's priority species and their habitats and distribute the map to all natural resource education and conservation entities. [High priority]
- 15) Create a database that contains available data and information for the species on our priority list and their habitats. Ensure that this database is available through the SCDNR website. [High priority]
- 16) Develop a catalogue of all natural resources education and outreach programs offered in South Carolina, including educational curricula. This catalogue will include a description of program/curricula content and contact information for the person(s) responsible for program development and implementation. The catalogue should be updated annually and made available on the SCDNR website. [Moderate priority]

## Habitat Protection

Habitat protection has been identified as one of the most important actions to assist in the protection of South Carolina's priority species by SCDNR biologists, species experts and attendees at the public information meetings held throughout the state (for a thorough discussion of these meetings, see Chapter 6: Partnership Development). The importance that SCDNR places on habitat protection for the benefit of South Carolina's wildlife is evident in the many programs currently in place at the SCDNR and in the partnerships SCDNR has forged with other state and federal agencies, organizations, academic institutions and industries. A list of SCDNR habitat protection programs and partnerships is presented in Box 4-3.

### BOX 4-3: SCDNR HABITAT PROTECTION PROGRAMS

- **The Heritage Trust Program:** Established to preserve those natural features and cultural remains. The purpose of the program is to inventory, evaluate and protect the elements considered the most outstanding representatives of South Carolina's heritage.
- **Forest Legacy Program:** The purpose of the program is to identify and protect environmentally important forest land from conversion to non-forest uses, through the use of conservation easements and fee purchases.
- **Focus Area Program:** The purpose of this program is to conduct landscape level conservation efforts that include private lands conservation. There are 12 habitat conservation focus area task forces in South Carolina; these are operated through the Atlantic Coast Joint Venture. Further description of the Focus Area Program is provided below in the discussion of the ACE Basin Project.
- **ACE Basin Project:** The first of SCDNR's Focus Areas, the ACE Basin Project is a unique partnership of state and federal governmental representatives, nonprofit conservation organizations, and private landowners that works to maintain the natural character of the Basin by promoting wise resource management and continuing traditional uses with improved public access. While encouraging traditional land uses such as agriculture, timber production, hunting, and fishing, the overall management goal is to maintain the area's ambiance while restricting industrial and resort development. To date, well over 316,160 ha (128,000 ac) in the Basin have been protected through conservation easements, management agreements, and fee title purchases.
- **Scenic Rivers Program:** The goal of this program is the conservation of South Carolina's river heritage through the proper management of the natural and cultural character of the state's river corridors. This program has the purpose of protecting "unique or outstanding scenic, recreational, geologic, botanical, fish, wildlife, historic or cultural values" of selected rivers or river segments in the state.
- **Forest Stewardship Program:** In partnership with the South Carolina Forestry Commission, Clemson Extension Service and the Natural Resource Conservation Service, SCDNR provides a technical service program designed to encourage multiple resource management on private non-industrial forestlands.
- **The South Carolina Conservation Bank Act:** Preserves the most significant natural and historic lands in our state by either purchasing the land outright or buying conservation easements from willing sellers. Dedicated funding is provided for the protection of wildlife habitat, parks, greenways, prime farmlands, historic sites, wildlife habitat and other biologically sensitive areas in the state. Funds come from a percentage of South Carolina's deed-recording fees, which are collected when real estate is sold in the state. A volunteer board made up of conservationists, sportsmen, scientists and business leaders from across the state will oversee the disbursement of grants to protect land. SCDNR acts as an advisor to this board.

**BOX 4-3: SCDNR HABITAT PROTECTION PROGRAMS (CONTINUED)**

- **National Estuarine Research Reserve System:** In partnership with the National Oceanic and Atmospheric Administration, SCDNR helps communities develop strategies to deal successfully with coastal resource issues including habitat restoration.
- **South Carolina Land Trust Network:** SCDNR is a member of this network, which facilitates the preservation of the natural and cultural character of South Carolina through the exchange of information among land trusts. The network creates awareness and seeks support of the general public to conserve natural resources of the state.
- **Beach Sweep/River Sweep:** In partnership with the South Carolina Sea Grant Consortium, SCDNR coordinates an annual, nationwide cleanup of inland and coastal waterways.

Historically, species conservation and management efforts have been employed to address single species to the exclusion of others occurring in the same habitat. However, SCDNR has recognized the importance of employing habitat or ecosystem-based conservation. By focusing on whole habitats or ecosystems, we are able to protect several species in a more cost-effective manner.

Loss and fragmentation of habitat have been identified as a major threat to many of the species included in South Carolina's Plan. There are many ways to prevent habitat loss and reduce the effects of past losses and fragmentation. One of the most expensive conservation tools is land acquisition; further land acquisition is frequently driven by land availability, not by what is required for high priority species. However, acquiring land is likely the most beneficial method of ensuring wildlife and habitat protection. Conservation easements are also extremely beneficial for habitat protection. It is imperative that SCDNR partner with other agencies and organizations to acquire and manage lands that are available for conservation.

Even if SCDNR or partners do not own lands, there are ways of protecting habitats. Coordination of wildlife goals and strategies during land planning processes and ability of SCDNR to review development and environmental impact plans for relevance to priority species can also assist in protecting habitats. An ever-present theme throughout the Strategy, education and outreach is imperative in the protection of the state's habitats.

*Conservation Actions*

- 1) Acquire property for protection of priority species and to ensure habitat linkage through fee simple acquisition and conservation easements in the following habitats:

**Terrestrial Habitats**

- a. Appalachian Oak and Oak-Pine Forest
- b. Basic Mesic Forest
- c. Acidic Mesic Forest
- d. High-elevation Forest
- e. Riverbanks, Streambanks and Alder Zones
- f. Moist or Wet Types
- g. Vertical or Horizontal Rock Outcrop
- h. Upland Forest
- i. Piedmont Small Stream Forest

- j. River Bottoms
- k. Cove Forest
- l. Grassland and Early Successional Habitats
- m. Sandhills Pine Woodland
- n. Seepage Slopes
- o. Ponds and Depressions
- p. Blackwater Stream Systems
- q. Pine woodland
- r. Upland Forest
- s. Wet Flatlands
- t. River Slopes and Stream Bottoms

#### **Watersheds**

- a. Santee River Watershed
- b. Savannah River Watershed
- c. Pee Dee River Watershed
- d. ACE Basin Watershed

#### **Coastal and Marine Habitats**

- a. Forested Habitats of the Coastal Plain
- b. Maritime Forest
- c. Early Successional Habitats of the Coastal Plain
- d. Managed Impoundments
- e. Tidal Fresh and Brackish Systems
- f. Isolated Nonforested Uplands
- g. Estuarine Systems
- h. Hammock Islands
- i. Ocean Beaches and Transition Zones
- j. Marine Ecosystem
- k. Man-made Structures

[Highest priority]

- 2) Continue to partner with private entities and other state and federal agencies to acquire land for habitat protection. Develop additional partnerships for land acquisition.

[Highest priority]

- 3) Restore and enhance impaired habitat, where feasible and cost-effective. Habitat enhancements include:

- a. Encourage nest/roost site retention/restoration
- b. Employ prescribed burning
- c. Restore natural stream courses and flows
- d. Eliminate or reduce invasive and non-native species from habitats
- e. Replant native plants
- f. Wetland restoration

[Highest priority]

- 4) Promote the importance of habitat protection and participation in conservation easement programs through education and outreach programs. [Highest priority]

- 5) Partner with other state and federal agencies, to promote habitat protection and provide technical support to private landowners. [Highest priority]
- 6) Develop and implement protective Best Management Practices (BMPs) for habitats and land uses throughout South Carolina. [Highest priority]
- 7) Participate in development and review of environmental plans (including FERC relicensing projects) to ensure appropriate habitat protection. [Highest priority]
- 8) Mitigate habitat threats that are caused by human practices such as entanglement in fishing gear, by-catch, boat strikes, dredging, chemical exposure, tower strikes, powerline strikes, nest disturbance, boat wakes, artificial light sources, and dewatering of streams. [Highest priority]
- 9) Encourage city, county and state planning entities to consider habitat protection in all development projects. [Highest priority]
- 10) Where possible, manage wildlife species and promote habitat protection on an ecoregions-wide and/or watershed-wide scale. [High priority]
- 11) Continue to partner with private entities, private landowners and other state and federal agencies to protect riparian areas from degradation. [High priority]
- 12) Continue SCDNR participation in Emergency Response training programs to ensure that SCDNR has the most current information on planning logistics and technology for dealing with coastal oil and hazardous material releases, as well as the most effective program to deal with the aftermath. [Moderate priority]

## **Invasive and Non-Native Species**

There are an estimated 50,000 non-native species in the U.S., and the number is steadily increasing. Many of these represent serious threats to agriculture, horticulture or forestry. Other non-native species are more likely to impact natural communities and individual populations of native wildlife species. Approximately 42 percent of the species listed as endangered or threatened under the federal Endangered Species Act are significantly impacted by invasive exotic species. On a national basis, the economic losses and environmental damage caused by exotic species total approximately \$120 billion per year (Pimentel et al. 2005). A recent survey of managers of 430 national wildlife refuges indicated that 80 percent of the refuges recognized problems with invasive exotic organisms. Refuge managers reported more than 790 invasive organisms, including 507 nonnative plants, 208 nonnative animals and 76 plant and animal diseases (Simonson et al. 2004).

Invasive and non-native species constitute a significant threat to South Carolina's biological diversity. Many native species are declining due to increasing competition or habitat degradation from invasive and non-native species. A list of those known to be located in South Carolina is

presented in Box 4-4. Feral hogs, feral cats, blue catfish, flathead catfish, red crayfish and fire ants are examples of animals that can cause serious impacts to natural communities and native species. Additionally, invasive and non-native plants such as beach vitex, hydrilla, water hyacinth, and Chinese privet pose threats to South Carolina’s species and habitats. Non-native disease organisms have also been shown to impact wildlife species.

Invasive and non-native species that do not directly harm wildlife species can harm animals indirectly by reducing or eliminating food sources for those species. For example, gypsy moths can eliminate mast for birds and mammals. An exotic forest pest in the Blue Ridge Ecoregion of South Carolina, the hemlock wooly adelgid, is causing decline of hemlock populations; loss of streamside hemlocks can result in water temperature increases.

<b>BOX 4-4: INVASIVE AND NON-NATIVE SPECIES KNOWN TO THREATEN SOUTH CAROLINA’S NATIVE WILDLIFE</b>	
<b>ANIMALS</b>	<b>AQUATIC PLANTS</b>
Feral Hogs	Hydrilla
Feral Cats	Water Hyacinth
Feral Dogs	Water Lettuce
Blue Catfish	Giant Salvinia
Flathead Catfish	Common Reed
Grass Carp	Alligatorweed
Aquarium Fish	Brazilian Elodea
Ornamental Pond Fish	Water Primrose
Red Crayfish	<b>TERRESTRIAL PLANTS</b>
Asian Clams	Beach Vitex
Zebra Mussel	Chinese Tallow Tree
Rapana Whelk	Russian Olive
Green Mussel	Thorny Olive
Fire Ants	Autumn Olive
Hemlock Wooly Adelgid	Japanese Privet
Gypsy Moth	Chinese Privet
<b>DISEASES</b>	Multiflora Rose
Avian Vacuolar Myelinopathy (AVM)	Japanese Honeysuckle
West Nile Virus	Kudzu
Sudden Oak Death	Chinese Wistea
Raccoon Roundworm	Asian Wisteria
Fish, Shellfish and Shrimp Diseases	Japanese Stilt Grass
	Wart Removing Herb

Impacts from invasive non-native species have been documented in South Carolina; control measures have been implemented to address these impacts. SCDNR is currently working to control aquatic invasive plant species in lakes and rivers throughout the state. Further, SCDNR has partnered with other organizations to investigate ways to reduce invasive and non-native species in South Carolina.

*Conservation Actions*

- 1) Prevent the spread of existing invasive and non-native species, eliminating them, where possible. [Highest priority]
- 2) Determine the impacts of invasive and non-native species on South Carolina’s priority species and habitats used by those species. [Moderate priority]

- 3) Strive to prevent the import of additional invasive and non-native species to South Carolina. [Moderate priority]
- 4) Develop and conduct an education and outreach campaign to raise awareness of the impacts of introducing non-native species into South Carolina. [Moderate priority]
- 5) Develop partnerships with other entities in South Carolina to address impacts associated with invasive and non-native species. [Moderate priority]

## Private Land Cooperation

Currently, 93 percent of the land in South Carolina is under private ownership. As such, SCDNR has little authority over habitat conservation and wildlife management on those lands. It is important that SCDNR enlist the cooperation of private landowners to protect priority species and their habitats. Encouragingly, many citizens in South Carolina recognize the importance of natural resources and the value of these resources to our quality of life. A number of programs are currently available to landowners through SCDNR as well as other state and federal agencies and public and private entities. A list of the private land programs provided by SCDNR, both independently and with partners is presented in Box 4-5.

### BOX 4-5: SCDNR PRIVATE LAND PROGRAMS

- **Wildlife Program:** SCDNR Wildlife Biologists conduct site visits and formal consultations with landowners and assist with management plan preparation and technical guidance for all species.
- **Forest Stewardship Program:** In partnership with the South Carolina Forestry Commission, Clemson Extension Service and the Natural Resource Conservation Service, SCDNR provides a technical service program. SCDNR Wildlife Biologists conduct site visits and assist with management plan preparation and technical guidance for the wildlife component of forest management plans.
- **Conservation District Program:** SCDNR personnel provide technical assistance and cost-share for farmland improvements, including water quality and erosion management and wildlife habitat improvement.
- **Red-cockaded Woodpecker Safe Harbor Program:** Allows for formal enrollment of qualifying private lands in a management program to enhance red-cockaded woodpecker populations.
- **Farm Bill Technical Support Program:** As an official member of the NRCS State Technical Committee, SCDNR participates in policy development and Farm Bill program priority setting. Additionally, SCDNR Wildlife Biologists provide technical guidance on Farm Bill program plans.
- **Landowner Incentive Program:** SCDNR directs federal cost share funds to qualifying lands for management practices benefiting red-cockaded woodpeckers and other “species at risk.”
- **US Fish and Wildlife Service Partners for Fish and Wildlife Program:** SCDNR works with this program on various habitat restoration projects on private lands (example: Partners for Trout in South Carolina’s upstate).
- **Focus Area Program:** The purpose of this program is to conduct landscape level conservation efforts that include private lands conservation. There are 12 habitat conservation focus area task forces in South Carolina; these are operated through the Atlantic Coast Joint Venture (example: ACE Basin Project).

Despite the number of programs available in South Carolina, the changing urban landscape mandates that other programs are likely necessary. Further, many private landowners are not aware of the current programs available to them.

*Conservation Actions*

- 1) Develop or expand partnerships with other entities to provide landowner assistance programs that focus on conservation of priority species and their habitats. [Highest priority]
- 2) Conduct outreach efforts to private landowners to:
  - a. Explain the ecological importance of protecting natural resources on private lands and the benefits of protecting those resources to all citizens of South Carolina.
  - b. Encourage voluntary participation in natural resource conservation activities.
  - c. Encourage natural resource stewardship by utilizing Best Management Practices (BMPs) on private lands.
  - d. Explain the mission of the SCDNR and the programs conducted by the department.[High priority]
- 3) Develop or modify landowner education and outreach programs to include information about South Carolina's priority species and habitats. [High priority]

**Public Land Management**

Only seven percent of the land in South Carolina is in public ownership by federal, state and local governmental agencies. Much of that land is not directly managed by the SCDNR; however, these lands provide critical protection for the state's priority species and their habitats. Agencies who manage ecologically important public lands in South Carolina, including SCDNR, SC Forestry Commission, SC Parks, Recreation and Tourism, US Fish and Wildlife Service, National Park Service and the US Forest Service are mandated to conserve native wildlife species and their habitats. Additionally, other public agencies, such as the US Department of Defense, US Department of Energy and some city and county park facilities manage ecologically important lands for protection of wildlife and their habitats.

The SCDNR has an excellent working relationship with other public land managers throughout the state. However, the conservation goals of these separate agencies may differ slightly, resulting in different conservation strategies and efforts. In order to provide the most efficient management of our priority species and their habitats, it is important to continue and enhance partnerships between SCDNR and other agencies.

*Conservation Actions*

- 1) Provide key information about management requirements for priority species and habitats in South Carolina to partners responsible for public land management. [Highest priority]
- 2) Continue to work with partners to manage and protect priority species and their habitats in South Carolina through other agency's funding programs. [Highest priority]

- 3) Ensure that priority species and their habitats on SCDNR lands are managed in accordance with the conservation actions provided in the CWCS. [Highest priority]

## **Regulatory Actions**

Within South Carolina, there are several state and federal entities with regulatory authority governing certain aspects of wildlife and habitat conservation. State and federal regulations in South Carolina govern conservation of rare, threatened and endangered species; protection of natural areas and specific natural habitats; take of game and nongame wildlife species; water and air quality; review and permitting of mining, dam construction, surface water discharge and groundwater withdrawal; dock and pier construction and other project developments.

As SCDNR biologists and other experts prepared species accounts, they identified areas where existing laws and regulations may need to be changed in order to protect priority species and habitats. They also identified areas for which no laws or regulatory authority exists to protect these species.

### *Conservation Actions*

- 1) Enhance SCDNR Law Enforcement capability to address priority wildlife species law enforcement needs. [Highest priority]
- 2) Develop Fisheries Management Plans for marine species that are not currently targeted in commercial or recreational fisheries and for species that are targeted, but for which no plan currently exists. [Highest priority]
- 3) Investigate the need to amend existing SCDNR regulations and/or develop additional SCDNR regulations to address conservation status of South Carolina's priority species. [High priority]
- 4) Investigate the need to amend existing SCDNR regulations and/or develop additional SCDNR regulations to address the effects of collecting and/or harvesting South Carolina's priority species. [Moderate priority]

## **Survey and Research Needs**

When preparation of South Carolina's CWCS was initiated, it quickly became apparent that SCDNR and other entities in South Carolina are lacking data for many of the priority species and their habitats. Historically, research and survey activities have focused on managed species, federally or state listed species, and activities funded by grants and private funds. In order to adequately manage for priority species in South Carolina, it is imperative that baseline research be conducted for these species.

Within this CWCS, Chapter 5: South Carolina Comprehensive Monitoring Program will specifically address survey and research needs as they apply to the priority species. The

conservation actions here are presented to illustrate the type of information that needs to be gathered.

#### *Conservation Actions*

- 1) Conduct surveys to determine the presence and extent of priority species populations and their habitat. [Highest priority]
- 2) Monitor the condition of priority species populations and their habitat, once discovered. [Highest priority]
- 3) Determine the impacts of contaminants (including thermal discharges) on South Carolina's priority species. [Highest priority]
- 4) Conduct research to identify the habitat requirements for South Carolina's priority species and determine whether existing habitats meet those requirements. [High priority]
- 5) Determine genetic relationships of new species and those species with questionable taxonomic designations. [Moderate priority]
- 6) Determine the effects of plant and animal invasive and nonnative species (including diseases) on South Carolina's priority species and their habitats. [Moderate priority]
- 7) Determine the effects of hunting/fishing on South Carolina's priority species. [Moderate priority]

#### **Urban and Developing Lands**

Since the 1950s, the United States had experienced a mass migration to the suburbs. Fueled by the proliferation of the automobile, residential and commercial growth has expanded into the far reaches of what once were pristine wetlands, uplands and forestlands. Many have determined that nationally land consumption has outpaced population growth two to one.

Anthony Downs of the Brookings Institute defines sprawl as "a specific form of suburbanization that involves extremely low-density settlement at the far edges of the settled area, spread out far into previously undeveloped land." Sprawl development began to take place in the last half of the 20<sup>th</sup> Century. However, when it arrived to South Carolina, it proceeded quickly. Land conversion in the state ranked ninth in the nation between 1992 and 1997, with over 539,700 acres converted for development. During this time period, South Carolina population increase was 5.3 percent while the percent of developed land was 30.2 for almost a six-fold increase. This dramatic growth has occurred primarily on the outskirts of the state's larger metropolitan areas, as well as Charlotte, North Carolina and in the coastal/tourism centers of Hilton Head Island, Charleston and Myrtle Beach. Much of this growth has come in the form of sprawl development. The impact of sprawl on wildlife has not been measured.

As previously natural lands are converted to urban lands, wildlife and habitat are undoubtedly affected. Obviously, habitat is lost or fragmented in this process. However, the impacts of development on South Carolina's priority species and their habitats can be mitigated, if efforts are made to do so. Effective planning is imperative in protecting natural resources during development.

#### *Conservation Actions*

- 1) Encourage responsible land use planning throughout South Carolina that ensures protection of natural resources. [Highest priority]
- 2) Collaborate with city and county municipalities and communities to reduce the impacts of development through the following:
  - a. Implementation of Best Management Practices
  - b. Planned development communities
  - c. Low impact development[Highest priority]
- 3) Participate in the environmental review process for development projects throughout South Carolina. [High priority]
- 4) Collaborate with partners to establish appropriate recommendations for riparian buffer widths to assist in protection of coastal and inland water quality. [High priority]
- 5) Collaborate with the South Carolina Department of Transportation (SCDOT) to protect priority species and their habitats during and after road construction. [High priority]
- 6) Partner with other state and federal agencies, conservation organizations, industries and permitting agencies to deter development in important breeding, feeding and roosting/nesting sites that are important to South Carolina's priority species. [Moderate priority]
- 7) Discourage development in habitats for South Carolina's priority species. [Moderate priority]

#### *Urban and Developed Lands Conservation Action Committee*

In April 2005, the Urban and Developed Lands Conservation Action Committee met to discuss priority species, their habitats and the overarching actions that could affect urban and developing lands in South Carolina. Table 4-2 contains a list of all attendees and their affiliation.

**TABLE 4-2: URBAN AND DEVELOPED LANDS CONSERVATION ACTION COMMITTEE ATTENDEES**

<b>Name</b>	<b>Affiliation</b>
John Cone	Home Builders Association of South Carolina
Mike Dawson	River Alliance
Paul Gettys	Katawba Valley Land Trust
John Hicks	Mayor, Town of Blythewood, South Carolina
Carolyn Jebailey	Sierra Club & Wildlife Action
Bill Molnar	Clemson University
Brad Wyche	Upstate Forever

The group identified five areas for conservation action opportunities. These areas are presented in Box 4-6.

**BOX 4-4: FIVE AREAS FOR CONSERVATION ACTION OPPORTUNITIES**

- Protection of habitat through acquisition and easements.
- Habitat (corridor and buffer) research and public education.
- Strengthen comprehensive planning through research, enforcement and public education. Coordinate the development process between the developer and local level stakeholders in a one-stop-shop manner.
- Promote better storm water management regulations and techniques on impervious surfaces. Develop constructive wetlands education and incentives.
- Develop a higher-level coordination and training program for all levels of government and professionals, appointed and elected officials.

The group then developed strategies that would address the five identified areas for conservation action in the urban/wildlife interface.

*Urban and Developed Lands Action Committee Recommendations*

- 8) Develop wildlife/development win-win situations and disseminate information to local governments and the development community. [Highest priority]
- 9) Assist local governments in drafting meaningful comprehensive plans, as they relate to the Natural Resources section of local comprehensive plans. [Highest priority]
- 10) Act as a repository for best management practices relating to natural resources. [Highest priority]
- 11) Encourage SCDNR staff to provide wildlife/habitat educational information to communities. Inform elected and appointed officials about environmental issues relating

to local development and wildlife/habitat issues and disseminate information on the following:

- a. Support the creation of local habitat protection capabilities.
- b. Work with local land trusts on the location of priority habitats.
- c. Promote and educate about transfer of development rights.
- d. Collaborate with local governments to develop best management practices for storm water run-off: education, incentives, and awards.

[Highest priority]

12) Provide wildlife/habitat research and demonstration projects. These could include:

- a. A buffer demonstration project that provides a win-win for both developers and the environment.
- b. Research projects on the impact of buffers and corridors on wildlife and habitat.
- c. A storm water demonstration project.

[Moderate priority]

## Prioritized Conservation Actions and Measures of Success

As discussed at the beginning of this chapter, all the conservation actions presented herein were prioritized; a complete discussion of this process is presented in Chapter 7: Prioritization, Implementation and Adaptive Management. In very general terms, conservation action priorities were determined based on six criteria presented in Box 4-5.

### BOX 4-5: SIX CRITERIA USED FOR DETERMINATION OF PRIORITY CONSERVATION ACTIONS

- **Feasibility:** Challenges can be mitigated, solutions are apparent. SCDNR can feasibly staff and implement the action and the results will be beneficial.
- **Opportunity:** SCDNR is able to implement the conservation action (i.e., opportunities exist; SCDNR has the authority to carry out the action).
- **Benefit:** Implementation of the action will result in benefits to the natural diversity of South Carolina. Benefits are considered in terms of unit of effort to achieve those benefits; that is, implementation results in multiple benefits to a given species or multiple species are benefited by a single action.
- **Proactive:** Implementation will result in proactive changes to address challenges; actions are more than a reactive response to ongoing challenges.
- **Partnerships:** Partnership opportunities exist for implementation, which provides the ability to leverage other resources.
- **Funding:** Implementation is eligible for SWG funding and/or matching funds exist.

Additionally, measures of success were developed for each of the conservation actions presented in South Carolina's CWCS. Conservation actions, a list of the highest priority species that area affected by implementation of the action, whether the action is proposed or ongoing (or both), the priority of the action and the measures of success that will be used to rate implementation of that action are all included in Table 4-3: Prioritized Conservation Actions and Measures of Success.

**TABLE 4-3: Prioritized Conservation Actions and Measures of Success**

<b>Conservation Action Area</b>	<b>Conservation Action</b>	<b>Species/Habitat Affected<sup>1</sup></b>	<b>Ongoing/Proposed</b>	<b>Priority</b>	<b>Measures of Success</b>
Education/ Outreach	Develop and enhance education and outreach programs that highlight the importance and value of the species on South Carolina’s Priority Species List and their contribution to the unique natural resource diversity of this state.	All Species	Ongoing	Highest	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given
	Develop and enhance education and outreach programs that encourage land stewardship values, particularly to private landowners in priority habitats.	All Species and Habitats	Ongoing	Highest	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given
	Develop and enhance education and outreach programs that inform the public about the importance of prescribed burning to benefit wildlife species.	American Kestrel, Northern Bobwhite, Red-cockaded woodpecker, Bachman’s Sparrow, Brown-headed Nuthatch, Henslow’s Sparrow, Gopher Tortoise, Pine Barrens Treefrog	Ongoing and Proposed	Highest	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given

<sup>1</sup> In consideration of space, not all species affected by the conservation action are listed. Selected highest priority species affected by each action will be presented in this table. The species and habitat accounts presented in their entirety in **Supplemental Volume: Species and Habitat Accounts** includes actions for all species in South Carolina’s CWCS.

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Education/ Outreach (Continued)	Ensure that accurate information about priority species and their habitats is made available, both within SCDNR and to any interested parties outside of the department. Interested parties can include state and federal agencies, academic institutions, private landowners, local municipalities, organizations and industry.	All Species and Habitats	Ongoing	Highest	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given
	Promote partnerships, both in development and implementation of education and outreach programs.	All Species and Habitats	Ongoing	High	# of partnerships created/supported; # of programs/products produced by partners; Feedback from partnerships
	Promote volunteer participation, both in education and outreach programs as well as in data collection.	Florida Manatee, Northern Bobwhite, Painted Bunting, American Kestrel, Loggerhead Shrike, Wood Thrush, Coral Snake, Loggerhead Turtle, Southern Hognose Snake	Ongoing	High	# of new volunteers; # of in-kind support hours; # of citizen supported programs
	Develop and enhance education and outreach programs that inform the public about the detrimental impacts of litter on priority species.	Leatherback Turtle, Little Blue Heron, Snowy Egret, White Ibis, Glossy Ibis, Tricolored Heron, Yellow-crowned Night Heron	Ongoing	Moderate	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Education/ Outreach (Continued)	Educate motor vehicle operators of the negative affects of crossing streams at multiple locations and using stream bottoms as trails.	American Shad, Atlantic Sturgeon, Shortnose Sturgeon, American Eel, Blueback Herring, Hickory Shad, All Freshwater Fish, Mussels and Snails	Proposed	Moderate	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given
	Develop and enhance programs that educate fishermen about employing correct techniques for capture and release of marine mammals, fish and invertebrates and programs that educate fishermen about the importance of reporting ship strikes and entanglements to authorities.	Florida Manatee, Atlantic Sturgeon, Shortnose Sturgeon, Humpback Whale, Right Whale, Freshwater and Marine Fish and Invertebrates	Proposed	Moderate	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given
	Utilize a variety of methods for information dissemination including: printer materials, websites, formal education/outreach programs, updates to existing education curricula, demonstration sites, landowner workshops, media.	All Species and Habitats	Ongoing	Moderate	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Education/ Outreach (Continued)	Develop and enhance education and outreach programs that discourage stocking, release and transplanting nonnative animal and plant species throughout South Carolina.	All Species and Habitats	Ongoing	Moderate	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given
	Ensure that all SCDNR employees are working to provide education and outreach information to partners and citizens of South Carolina.	All Species and Habitats	Ongoing	Highest	Management review of employee compliance; # of employee training seminars conducted; # of employees attending seminars
	In consultation with SCDNR biologists, identify “poster species” that will highlight conservation messages in each ecoregion of South Carolina. Enhance existing education and outreach programs in SCDNR to include priority species and their habitats.	All Species and Habitats	Ongoing and Proposed	Highest	Completed review and update of existing SCDNR education programs; selection of “poster species” by ecoregions; # of programs/media created around those species; # of audiences reached; # of participants reached; # of programs/media given
	Create a map that identifies locations of South Carolina’s priority species and their habitats and distribute the map to all natural resource education and conservation entities.	All Species and Habitats	Proposed	High	Final map created and distributed to partners, public; feedback from partners/public collected and considered

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Education/ Outreach (Continued)	Create a database that contains available data and information for the species on our priority list and their habitats. Ensure that this database is available through the SCDNR website.	All Species and Habitats	Proposed	High	Final database created and implemented; database access available on-line to partners and public; feedback from partners/public collected and considered
	Develop a catalogue of all natural resources education and outreach programs offered in South Carolina, including educational curricula. This catalogue will include a description of program/curricula content and contact information for the person(s) responsible for program development and implementation. The catalogue should be updated annually and made available on the SCDNR website.	All Species and Habitats	Proposed	Moderate	Final catalog created and distributed to partners and public; feedback from partners/public collected and considered
Habitat Protection	Acquire property for protection of priority species and to ensure habitat linkage through fee simple acquisition and conservation easements all priority habitats.	All Species and Habitats	Ongoing	Highest	# of acres acquired or protected; # of long-term cooperative habitat protection projects; # of completed site inventories; # of acquisition processes that incorporate considerations/priorities identified in the CWCS
	Continue to partner with private entities and other state and federal agencies to acquire land for habitat protection. Develop additional partnerships for land acquisition.	All Species and Habitats	Ongoing	Highest	# of acres acquired or protected; # of long-term cooperative habitat protection projects; # of completed site inventories; # of acquisition processes that incorporate considerations/priorities identified in the CWCS

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Habitat Protection (Continued)	Restore and enhance impaired habitat, where feasible and cost-effective. Habitat enhancements include encouraging nest/roost site retention/restoration; employing prescribed burning; restoring natural stream courses and flows; eliminating or reducing invasive and non-native species from habitats; replanting native plants; and wetland restoration.	Northern Yellow Bat, Black Duck, Mallard, Northern Bobwhite, Eastern Meadowlark, Red-cockaded Woodpecker, American Kestrel, Northern Pintail, Bachman’s Sparrow, Brown-headed Nuthatch, Pine Barrens Treefrog, Loggerhead Turtle, Hawksbill Turtle, Kemp’s Ridley Turtle, Robust Redhorse, American Eel, American Shad, Atlantic Sturgeon, Shortnose Sturgeon, Savannah Lilliput	Proposed	Highest	# of acres/sites restored; species/population response to restoration; % improvement in measures of species diversity/composition; % increase in nesting and roosting activities; ; # of acres burned; # acres/miles of stream positively affected by management; measures of habitat quality/water quality improvements; % reduction of invasive/non-native species;
	Promote the importance of habitat protection and participation in conservation easement programs through education and outreach programs.	All Species and Habitats	Ongoing	Highest	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given
	Partner with other state and federal agencies to promote habitat protection and provide technical support to private landowners.	All Species and Habitats	Ongoing	Highest	# of technical guidance/support interactions
	Develop and implement protective Best Management Practices (BMPs) for habitats and land uses throughout South Carolina.	Florida Manatee, American Oystercatcher, Prairie Warbler, All Freshwater, Marine and Diadramous Fish, All Freshwater and Marine Invertebrates	Proposed	Highest	# of BMPs developed; # of BMP recommendations made; % of recommendations implemented; measures of degree of compliance; quality of compliance

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Habitat Protection (Continued)	Participate in development and review of environmental plans (including FERC relicensing projects) to ensure appropriate habitat protection.	All Species and Habitats	Ongoing	Highest	# of site visits; # of comments forwarded; # of plans/permits commented on; # of partnerships developed
	Mitigate habitat threats that are caused by human practices such as entanglement in fishing gear, by-catch, boat strikes, dredging, chemical exposure, tower strikes, powerline strikes, nest disturbance, boat wakes, artificial light sources, and dewatering of streams.	Florida Manatee, Black-crowned Night Heron, Eastern Wood Peewee, Wood Thrush, Leatherback Turtle, Loggerhead Turtle, American Eel, American Shad, Atlantic Sturgeon, Shortnose Sturgeon	Ongoing and Proposed	Highest	# of species for which threats are identified and mitigated; # of threats mitigated; % increase in priority species numbers; % decrease in effects of threats on priority species
	Encourage city, county and state planning entities to consider habitat protection in all development projects.	All Species and Habitats	Proposed	Highest	# of entities participating; # of land use plans developed; # of technical guidance created; # of land owner agreements/participants in programs aimed at listed species recovery; # of data requests and exchanges; project-specific results of collaborative efforts
	Where possible, manage wildlife species and promote habitat protection on an ecoregions-wide and/or watershed-wide scale.	All Species and Habitats	Ongoing	High	Measures of degree of compliance; % ecoregions protected; % watersheds protected
	Continue to partner with private entities, private landowners and other state and federal agencies to protect riparian areas from degradation.	Florida Manatee; American Oystercatcher; Black-crowned Night Heron; Glossy Ibis; Little Blue Heron; Prairie Warbler; Bog Turtle; All Freshwater Fish, Crayfish, Mussels and Snails; All Marine Fish and Invertebrates; All Diadramous Fish	Ongoing	High	# of decision-making protocols adapting aquatic conservation priorities; # of acres of riparian habitat protected; # of acres/miles of stream/wetland positively affected; # of active partnerships; # of new partnerships developed; # of information exchanges

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Habitat Protection (Continued)	Continue SCDNR participation in Emergency Response training programs to ensure that SCDNR has the most current information on planning logistics and technology for dealing with coastal oil and hazardous material releases, as well as the most effective program to deal with the aftermath.	Florida Manatee, Black Skimmer, Eastern Brown Pelican, Lesser Scaup, Wilson’s Plover, Willet, All Marine Fish, All Marine Invertebrates	Ongoing	Moderate	# of trainings attended; # of individuals trained; # of programs developed
Invasive and Non-Native Species	Prevent the spread of existing invasive and non-native species, eliminating them, where possible.	Bald Eagle, Black Duck, Eastern Meadowlark, Wood Thrush, Florida Pine Snake, Loggerhead Turtle	Ongoing and Proposed	Highest	% of invasive/non-native species populations decreased; # of areas surveyed; # of species/populations located; # of individuals removed
	Determine the impacts of invasive and non-native species on South Carolina’s priority species and habitats used by those species.	Black Duck, Bald Eagle, Northern Pintail, Eastern Wood Peewee, Gopher Tortoise, Loggerhead Turtle, Atlantic Sturgeon, Shortnose Sturgeon	Ongoing and Proposed	Moderate	# of areas surveyed; # of species/populations located; identification of causal factors in population change
	Strive to prevent the import of additional invasive and non-native species to South Carolina.	All Species and Habitats	Ongoing and Proposed	Moderate	# of species protocols established; # of areas surveyed; # of species/populations located; identification of causal factors in population change
	Develop and conduct an education and outreach campaign to raise awareness of the impacts of introducing non-native species into South Carolina.	All Species and Habitats	Ongoing and Proposed	Moderate	# of web-products developed/updated; # of media/outreach products developed/updated; # of reports/publications developed/distributed; # of audiences reached; # of participants/volunteers reached; # of programs given

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Invasive and Non-Native Species (Continued)	Develop partnerships with other entities in South Carolina to address impacts associated with invasive and non-native species.	All Species and Habitats	Ongoing and Proposed	Moderate	# of partnerships developed; # of information exchanges; # of Memoranda of Agreement/Understanding developed
Private Land Programs	Develop or expand partnerships with other entities to provide landowner assistance programs that focus on conservation of priority species and their habitats.	Black Bear, Swamp Rabbit, American Kestrel, Swallow-tailed Kite, Red-cockaded Woodpecker, Henslow’s Sparrow, Northern Bobwhite, Bog Turtle	Ongoing	Highest	# of partnerships developed; # of information exchanges; # of Memoranda of Agreement/Understanding developed; # of programs implemented
	Conduct outreach efforts to private landowners to: explain the ecological importance of protecting natural resources on private lands and the benefits of protecting those resources to all citizens of South Carolina; encourage voluntary participation in natural resource conservation activities; encourage natural resource stewardship by utilizing Best Management Practices (BMPs) on private lands; and explain the mission of the SCDNR and the programs conducted by the department.	All Species and Habitats	Ongoing	High	# of audiences reached; # of participants in programs; # of volunteers recruited; # of positive/negative comments from public; # of public interactions/programs offered
	Develop or modify landowner education and outreach programs to include information about South Carolina’s priority species and habitats.	All Species and Habitats	Ongoing	High	# of audiences reached; # of participants in programs; # of volunteers recruited; # of positive/negative comments from public; # of public interactions/programs offered
Public Land Management	Provide key information about management requirements for priority species and habitats in South Carolina to partners responsible for public land management.	All Species and Habitats	Proposed	Highest	# of information exchanges; database completed and published on the internet; # of educational efforts; # of CWCS recommendations implemented on public lands

<b>Conservation Action Area</b>	<b>Conservation Action</b>	<b>Species/Habitat Affected</b>	<b>Ongoing/Proposed</b>	<b>Priority</b>	<b>Indicators of Success</b>
Public Land Management (Continued)	Continue to work with partners to manage and protect priority species and their habitats in South Carolina through other agency’s funding programs.	All Species and Habitats	Ongoing and Proposed	Highest	# of partnerships formed; amount of money spent and in-kind services conducted by partners on public lands
	Ensure that priority species and their habitats on SCDNR lands are managed in accordance with the conservation actions provided in the CWCS.	All Species and Habitats	Ongoing	Highest	# of CWCS recommendation implemented on DNR lands; # of management plans influenced by CWCS research projects
Regulatory Actions	Enhance SCDNR Law Enforcement capability to address priority wildlife species law enforcement needs.	All Species and Habitats	Ongoing	Highest	Review law enforcement capabilities conducted; # of calls/responses to priority species concerns
	Develop Fisheries Management Plans for marine species that are not currently targeted in commercial or recreational fisheries and for species that are targeted, but for which no plan currently exists.	Many Marine Fish and Invertebrates	Ongoing	Highest	# of plans developed; # of proposed recommendations implemented
	Investigate the need to amend existing SCDNR regulations and/or develop additional SCDNR regulations to address conservation status of South Carolina’s priority species.	American Oystercatcher, Many Freshwater Mussels and Crayfish, Eastern Brook Trout	Ongoing	High	Adherence to schedules for rules review and updates; # of regulation change proposals; # of species protected from unregulated use or impact; # of regulation changes that enhance or protect wildlife or habitat; amount of habitat affected
	Investigate the need to amend existing SCDNR regulations and/or develop additional SCDNR regulations to address the effects of collecting and/or harvesting South Carolina’s priority species.	Eastern Fox Squirrel, Eastern Spotted Skunk, Shovel-nosed Salamander, Atlantic Sturgeon, Shortnose Sturgeon	Ongoing	Moderate	Adherence to schedules for rules review and updates; # of regulation change proposals; # of species protected from unregulated use/impact; # of regulation changes that enhance or protect wildlife or habitat; amount of habitat affected

Conservation Action Area	Conservation Action	Species/Habitat Affected	Ongoing/Proposed	Priority	Indicators of Success
Survey and Research Needs	Conduct surveys to determine the presence and extent of priority species populations and their habitat.	All Species and Habitats	Ongoing and Proposed	Highest	# of areas surveyed; # of new survey sites; # of species/populations located; compilation of new information on distribution and population size estimates
	Monitor the condition of priority species populations and their habitat, once discovered.	All Species and Habitats	Ongoing and Proposed	Highest	# of new monitoring sites or species protocols established; # of species for which trend information can be assessed; # of species for which population targets can be assigned; compilation of habitat trend information
	Determine the impacts of contaminants (including thermal discharges) on South Carolina’s priority species.	All Species and Habitats	Ongoing and Proposed	Highest	# of areas surveyed; # of species/populations influenced located; compilation of new data collected on impacts and life history
	Conduct research to identify the habitat requirements for South Carolina’s priority species and determine whether existing habitats meet those requirements.	All Species and Habitats	Ongoing and Proposed	High	# of areas surveyed; # of new survey sites; # of species/populations located; compilation of new data collected on life history requirements
	Determine genetic relationships of new species and those species with questionable taxonomic designations.	Northern Yellow Bat, Eastern Milk Snake, Atlantic Sturgeon, Carolina Pygmy Sunfish, “Broadtail” Madtom, Robust Redhorse, Highfin Carpsucker, Barrel Floater, Brother Spike,	Ongoing and Proposed	Moderate	# of species surveyed; # of genetic analyses conducted; # of taxonomic issues resolved; compilation of new data collected on genetic and taxonomic relationships

<b>Conservation Action Area</b>	<b>Conservation Action</b>	<b>Species/Habitat Affected</b>	<b>Ongoing/Proposed</b>	<b>Priority</b>	<b>Indicators of Success</b>
Survey and Research Needs (Continued)	Determine the effects of plant and animal invasive and nonnative species (including diseases) on South Carolina’s priority species and their habitats.	Bald Eagle, Black Duck, Eastern Wood Peewee, Mallard, Worm-eating Warbler, Northern Pintail, Loggerhead Turtle, Atlantic Sturgeon, Florida Softshell Turtle,	Ongoing and Proposed	Moderate	# of areas surveyed; # of new survey sites; # of species populations located; compilation of data collected on survival, competition, predation, response to management
	Determine the effects of hunting/fishing on South Carolina’s priority species.	All Marine Fish and Invertebrates, All Diadramous Fish, Appalachian Cottontail, Swamp Rabbit, Eastern Fox Squirrel, Eastern Brook Trout	Ongoing and Proposed	Moderate	# of areas surveyed; # of new survey sites; # of species populations affected; compilation of data collected on survival, competition, predation, response to management
Urban and Developing Lands	Encourage responsible land use planning throughout South Carolina that ensures protection of natural resources.	All Species and Habitats	Ongoing and Proposed	Highest	# of cooperators; # of technical guidance interactions; # of land owner/agency contacts; % of recommendations implemented; # of instances of DNR participation in review processes
	Collaborate with city and county municipalities and communities to reduce the impacts of development through the following: implementation of Best Management Practices; planned development communities; and low impact development.	All Species and Habitats	Ongoing and Proposed	Highest	# of collaborators; # of BMPs developed; # of BMP recommendations made; % of recommendations implemented; measures of degree of compliance; quality of compliance
	Participate in the environmental review process for development projects throughout South Carolina.	All Species and Habitats	Ongoing	High	# of site visits; # of comments forwarded; # of plans/permits commented on; # of partnerships developed

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Urban and Developing Lands (Continued)	Collaborate with partners to establish appropriate recommendations for riparian buffer widths to assist in protection of coastal and inland water quality.	All Species and Habitats	Ongoing	High	# of decision-making protocols adapting aquatic conservation priorities; # of acres/miles of stream/wetland positively affected; # of active partnerships; # of new partnerships developed; # of information exchanges
	Collaborate with the South Carolina Department of Transportation (SCDOT) to protect priority species and their habitats during and after road construction.	Diamondback Terrapin, Rafinesque’s Big-eared Bat, Coral Snake, Florida Pine Snake, Southern Hognose Snake, Mimic Glass Lizard, Slender Glass Lizard, Northern Pine Snake	Ongoing and Proposed	High	# of plans/permits commented on; # of site visits; # of collaborative efforts; # of project partnerships established; # of species protection measures implemented
	Partner with other state and federal agencies, conservation organizations, industries and permitting agencies to deter development in important breeding, feeding and roosting/nesting sites that are important to South Carolina’s priority species.	All Species and Habitats	Ongoing and Proposed	Moderate	# of partnerships developed; # of information exchanges; # of sites protected; # of roosts/sites surveyed; project-specific results of collaborative efforts
	Discourage development in habitats for South Carolina’s priority species.	All Species and Habitats	Ongoing and Proposed	Moderate	# of species for which threats are conclusively identified and abated; # of partnerships developed; # of information exchanges; # of sites protected; # of sites surveyed; project-specific results of collaborative efforts

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Urban and Developing Lands (Continued)	Develop wildlife/development win-win situations and disseminate information to local governments and the development community.	All Species and Habitats	Proposed	Highest	# of information requests received and responded to; % of recommendations implemented; # of mitigation scenarios developed; # of species/habitats affected; # of programs conducted
	Assist local governments in drafting meaningful comprehensive plans, as they relate to the Natural Resources section of local comprehensive plans.	All Species and Habitats	Ongoing and Proposed	Highest	# of partnerships developed; # of information exchanges; # of comprehensive plans prepared; % of recommendations implemented; # of comprehensive plans commented on
	Act as a repository for best management practices relating to natural resources.	All Species and Habitats	Proposed	Highest	Development of database and information infrastructure; # of information exchanges; # of partnerships formed; user evaluations and comments
	Encourage SCDNR staff to provide wildlife/habitat educational information to communities. Inform elected and appointed officials about environmental issues relating to local development and wildlife/habitat issues and disseminate information on the following: support the creation of local habitat protection capabilities; work with local land trusts on the location of priority habitats; promote and educate about transfer of development rights; and collaborate with local governments to develop best management practices for storm water run-off: education, incentives, and awards.	All Species and Habitats	Ongoing and Proposed	Highest	Management review of employee compliance; # of employee training seminars conducted; # of employees attending seminars; public surveys of outreach; # of partnerships developed; # of public/educational interactions

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Urban and Developing Lands (Continued)	Provide wildlife/habitat research and demonstration projects. These could include: a buffer demonstration project that provides a win-win for both developers and the environment; research projects on the impact of buffers and corridors on wildlife and habitat; and a storm water demonstration project.	All Species and Habitats	Proposed	Moderate	# of projects/products developed; # of audiences reached; # of participants in programs; # of presentations/programs offered